

## **CLAIMS**

1/ A security method using information transmission by light means between a user electronic apparatus (1) having at least one input interface (1b, 12) and a screen (1a), and an electronic security device (6) which comprises:

- a receive interface having at least one light sensor (10) for receiving input information coming from the user electronic apparatus;

10 - an emit interface (11, 16, 23, 32) adapted to emit output information as a function at least of received input information, the output information corresponding to a security code for communicating to the input interface (1b, 12) of the user electronic apparatus; and

15 - an electronic central unit (7) connected to the receive and emit interfaces and adapted to determine the output information as a function at least of the input information and to cause said output information to be emitted by the emit interface;

20 the security method comprising the following steps:  
a) causing the input information to be transmitted  
by the user electronic apparatus (1) to the receive  
interface (10) of the electronic security device

b) causing the output information to be determined  
25 by the central unit (7) of the electronic security  
device as a function of the input information.

c) causing the emit interface (11, 16, 23, 32) of the electronic security device to emit the output information corresponding to the input information.

30 communicating said security code to the user electronic apparatus, via the input interface (1b, 12) of said user electronic apparatus; and

d) verifying that the security code received by the user electronic apparatus is related to the input information by a predetermined relationship.

the method being characterized in that during step a), the light sensor (10) of the electronic security

- device is placed facing the screen (1a) of the user electronic apparatus while said screen is caused to emit a modulated light signal carrying the input information.
- 5 2/ A method according to claim 1, in which during step d), certain operations performed by means of the user electronic apparatus (1) are authorized or not authorized as a function of verifying the security code.
- 10 3/ A method according to claim 1 or claim 2, in which the electronic security device (6) belongs to a medium (3) carrying digital data and readable by the user electronic apparatus (1).
- 15 4/ A method according to claim 3, in which the data medium used is an optical disk (3) having an annular data area (4) surrounding a central portion (5) carrying no digital data, which central portion includes the light sensor (10).
- 20 5/ A method according to any preceding claim, in which, during step a), said modulated light signal is emitted in a predetermined area (17) belonging to the screen, and the light sensor (10) of the data medium is placed in the immediate vicinity of said predetermined area.
- 25 6/ A method according to claim 5, in which, during step a), said predetermined area (17) of the screen is indicated by at least one mark (18) displayed by the screen (1a).
- 30 7/ A method according to any preceding claim, in which, during step c), the output information is emitted by the electronic security device (6) in the form of a sound signal.

T037057-97/000660

8/ A method according to claim 7, in which the sound signal containing the output information is listened to by a human operator, which operator determines the security code as a function of the listened-to signal and communicates this security code to the user electronic apparatus via its input interface (1b).

9/ A method according to claim 7, in which the sound signal containing the output information is received directly by the input interface (12) of the user electronic apparatus.

10/ A method according to any one of claims 7 to 9, in which the sound signal containing the output information is transmitted to a remote monitoring station (13) which determines the security code as a function of said sound signal and transmits said security code to the input interface of the user electronic apparatus.

15/ 20/ 11/ A method according to any preceding claim, in which during step c), the output information is emitted by the electronic security device (6) by being displayed on a display device (23, 32).

25/ 12/ A method according to any preceding claim, in which encoded data is caused to be interchanged between a remote central station (13) communicating with the user electronic apparatus (1) and the central unit (7) of the electronic security device via the emit and receive interfaces (11, 16, 23, 32; 10) of said electronic security device.

30/ 35/ 13/ A method according to any preceding claim, in which the electronic security device (6) stores a count of units of value, and the central unit (7) of said electronic security device is adapted to cause said count of units of value to vary as a function of encoded data

received and emitted by the central unit via the received and emit interface (10; 11, 16, 23, 32).

- 14/ A method according to any preceding claim, in which  
5 the electronic security device (6) belongs to a portable  
digital data medium (3) which can be read by the user  
electronic apparatus (1) while said data medium is set in  
motion, the electronic security device (6) storing at  
least one count of utilization units, and the central  
10 unit (7) of said security device causing said count to  
vary as a function of the movements of the data medium as  
detected by a motion sensor (19).
- 15/ A method according to claim 14, in which the  
utilization unit count is read by an external reader (22)  
using a communication interface (21) belonging to said  
security device (6).
- 16/ A method according to any preceding claim, including  
20 a step of activating at least certain functions of the  
electronic security device (6), during which step a  
predetermined access code is communicated to the central  
unit (7) of said electronic security device.
- 25 17/ A method according to claim 16, in which, during the  
activation step, the access code is communicated to the  
central unit (7) by means of a user-actuatable input  
interface (33) of the electronic security device (6).
- 30 18/ A method according to claim 16, in which, during the  
activation step, the access code is communicated to the  
central unit (7) by positioning the light sensor (10) of  
the electronic security device (6) successively in  
register with a plurality of predetermined areas (35)  
35 belonging to the screen (1a) of the user electronic  
apparatus, the various predetermined areas (35) of the  
screen (1a) emitting respective different predetermined

optical signals, each corresponding to a symbol displayed on the screen.

19/ A method according to claim 16, in which, in order to  
5 communicate the access code to the central unit (7) of the electronic security device, the access code is initially communicated to the user electronic apparatus (1) using the input interface (1b) of the user electronic apparatus, the light sensor (10) of the electronic  
10 security device is placed facing the screen (1a) of the user electronic apparatus, and said screen is caused to emit a modulated light signal corresponding to said access code.

15 20/ A method according to any preceding claim, in which, during step b), the central unit (7) of the electronic security device is caused to determine the output information as a function of the input information and a personal code previously communicated to said central  
20 unit (7) by the user of the electronic security device (6).

21/ A method according to claim 20, in which, during step b), the personal code is communicated to the central unit (7) of the electronic security device (6) by means of a user-actuatable input interface (33) of the electronic security device (6).

22/ A method according to claim 20, in which, during step  
30 b), the personal code is communicated to the electronic central unit (7) by positioning the light sensor (10) of the electronic security device successively in register with a plurality of predetermined areas (35) belonging to the screen (1a) of the user electronic apparatus, these  
35 various predetermined areas (35) of the screen (1a) emitting respective different predetermined light signals

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and each corresponding to a symbol displayed on the screen.

- 23/ A method according to claim 20, in which, during step  
5 b), to communicate the personal code to the central unit  
(7) of the electronic security device, the personal code  
is initially communicated to the user electronic  
apparatus by using the input interface (1b) of said user  
electronic apparatus, the light sensor (10) of the  
10 electronic security device is placed facing the screen  
(1a) of the electronic user apparatus, and said screen is  
caused to emit a modulated light signal corresponding to  
said personal code.

15 24/ A method according to any one of claims 20 to 23, in  
which, during step d), a monetary operation is authorized  
or not authorized.

20 25/ A method according to any one of claims 20 to 24, in  
which the electronic security device stores at least one  
count of units of value, and during step d) an operation  
implying a change to said count of units of value is  
authorized or not authorized.

25 26/ A method according to claim 25, in which, during step  
d), units are exchanged between the count of units of  
value in the electronic security device and a remote  
count of units (13a) managed by a remote apparatus (13)  
connected by telecommunications means (14) to the user  
30 electronic apparatus (1).

27/ A method according to claim 26, in which, during step  
d), after a count of units of value in the electronic  
security device (6) has been modified, the output  
35 interface (11, 16) is caused to emit acknowledgment  
information, and the acknowledgment information is  
communicated to the user electronic apparatus (1) via the

input interface (1b, 12) of said user electronic apparatus.

28/ A method according to any one of claims 20 to 23, in which, during step a):

- the user is caused to select a screen area (35) on the screen (1a) of the user electronic apparatus, and during step d) after modifying the count of units of value in the electronic security device (6) and

10 associated with predetermined visual signaling amongst a plurality of screen areas associated with different visual signaling, said screen areas (35) emitting respective different modulated light signals carrying different input information;

15 - the light sensor (10) of the electronic security device is placed facing the screen area (35) selected by the user and the modulated light signal emitted by said screen area is picked up by means of said light sensor; and

20 during step d), the user's selection is confirmed as a function of verifying the security code received by the user electronic apparatus during step d) after modifying the count of units of value in the electronic security device (6).

25 29/ A method according to claim 28, in which, during step d), a count of votes is incremented corresponding to the selection made by the user during step a), and providing said selection is validated by verification of the security code.

30/ A method according to claim 28 or claim 29, in which the electronic security device (6) stores information specifying previous elections in which the user of the 35 electronic security device has participated, said information being updated by means of input information during step a), and during step b) or c), normal

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operation of the electronic security device is inhibited if the input information received for a new vote indicates that the user has already voted in this election.

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31/ A method according to claim 30, in which, during step d), the screen is caused to emit a modulated light signal carrying an acknowledgment signal confirming that the user's vote has been taken into account, and the

10 participation information in the memory of the electronic security device is updated only when the light sensor (10) of the electronic security device has received this acknowledgment signal.

15 32/ A method according to any one of claims 28 to 31, in which the modulated light signals corresponding to different screen areas (35) are modified in random manner after each vote cast by a user.

20 33/ A method according to any one of claims 28 to 32, in which the different screen areas (35) are juxtaposed on the screen (1a) of the user electronic apparatus.

25 34/ A method according to any preceding claim, in which the input information is transmitted between at least two emitting areas (17) belonging to the screen (1a) of the user electronic apparatus and at least two light sensors (10) belonging to the electronic security device (6).

30 35/ A method according to claim 34, in which the light signals received by the two light sensors (10) are decoded by calculating a difference between said light signals.

35 36/ A method according to claim 35, in which a binary signal is determined by comparing said difference with a

YOSSTOT-917/000660

threshold value, and then said binary signal is processed by median filtering.

5       37/ A method according to claim 35, in which a binary signal is determined by comparing said difference with a threshold value previously determined by causing a predetermined calibration signal to be transmitted between the emitting areas (17) of the screen (1a) and the light sensors (10).

10      38/ A method according to any one of claims 34 to 37, in which one of the emitting areas (17) of the screen (1a) emits a modulated light signal, while the other of said emitting areas (17) emits a constant light signal.

15      39/ An optical disk (3) for implementing a method according to any preceding claim, the disk comprising an annular data area (4) surrounding a central portion (5) carrying no digital data, said optical disk being

20      readable by a user electronic apparatus (1) by means of a light beam reader (2), which user electronic apparatus further comprises at least one input interface (1b, 12) and a light-emitting screen (1a), said data medium including an electronic security device which comprises:

25            - a receive interface having a least one light sensor (10) disposed in the central portion (5) of the optical disk and adapted to receive input information coming from the screen (1a) of the user electronic apparatus;

30            - an emit interface (11, 16, 23, 32) adapted to emit output information as a function of received input information, the output information corresponding to a security code for communication to the input interface (1b, 12) of the user electronic apparatus; and

35            - an electronic central unit (7) connected to the receive and emit interfaces and adapted to determine the output information as a function of the input information

and to cause said output information to be emitted by the emit interface.

40/ An optical disk according to claim 39, in which the  
5 security device (6) further includes a motion sensor  
(19).